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(54) Abstract Title
A building panel with pressure sensitive adhesive

(57) A building panel such as a flooring panel 1 comprises edge surfaces 9, 15 having a groove 16 which is complementary in shape to a protrusion or 'tongue' 10. Each edge surface has contact surfaces 17a, 17b which are coated with a pressure sensitive adhesive 18 so that upon interlocking, the panels are held together securely. The panels can be taken apart again as the adhesive does not form a permanent bond. The pressure sensitive adhesive may comprise water-borne, hot-melt or solvent based adhesive or a combination thereof and may include polymer latex, a resin, a tackifier, plasticisers, wetting agents, thickeners, defoamers or biocides. The adhesive maybe applied within a recess in the edge surface 31a, 31b so that it is less exposed to dust. The panel may comprise a plurality of layers such as a decorative layer 5, a transparent layer 6, a protective layer 4 and a layer of fibreboard 3. Methods of producing a building panel and joining up building panels are also claimed.

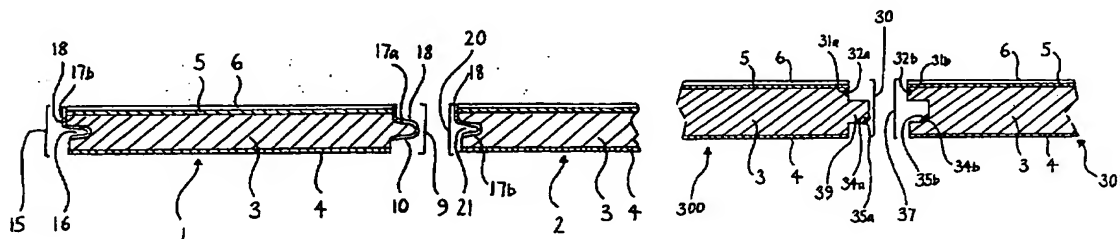


Fig. 1

Fig. 3

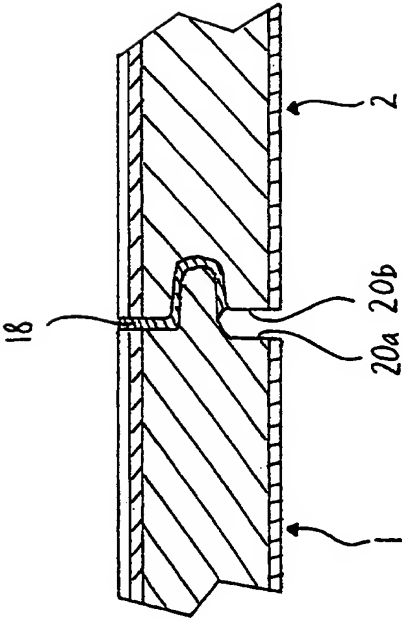


Fig. 2

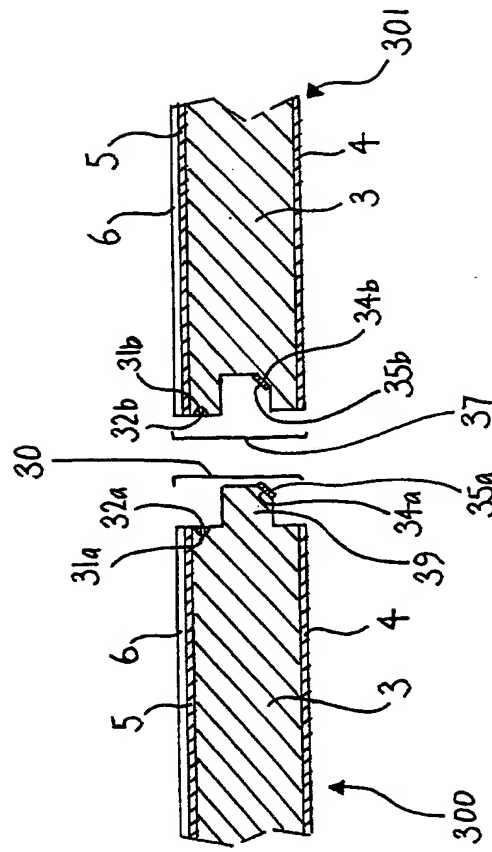


Fig. 3

PANELS

The present invention relates to panels, in particular to building panels such as floor panels.

5 The use of panels to clad floors, walls and ceilings is a popular way of decorating buildings and rooms. Panels of a manageable size are convenient to store and transport, and can also be easily installed even by an untrained fitter such as a DIY enthusiast.

10 The various types of panelling in use are typically designed to butt together, generally by interlocking along adjacent, contacting edges. Such panels are commonly used to cover an existing surface such as a floor or wall, or to create a new surface such as a partition, fence or wall.

15 The use of panelled flooring is especially popular at present. Typically, panels of wood, particleboard or other suitable material are securely joinable via interlocking tongue-and-groove joints to form a uniform floor surface without visible gaps between the panels. The resulting
20 floor is both visually attractive and is easy to clean.

 Provided that the flooring panels are securely interlocked to form a larger surface, they need not individually be fastened to the existing surface such as to the floor which they are covering. It is in fact
25 preferable that the panelled surface remains as a "floating" floor not directly fixed to the floor surface below. Each panel is held firmly in position by

interlocking with adjoining panels.

The panels are securely fixed by the application of adhesive between the joints. The adhesive must be applied along the tongue and/or groove of each joint immediately
5 prior to fitting each panel. Once the adhesive has dried or set, the panels will be securely bonded together, forming a uniform floor surface in which individual panels are unable to slip apart or become disjointed during use.

There are several disadvantages to the abovementioned
10 system. The fitter must take time and care to apply the adhesive evenly and in the correct amount along each joint. If too much adhesive is applied, the excess will be forced out from between the panels once they are joined. Any such excess adhesive must be removed immediately otherwise it
15 will dry undesirably and unattractively on the upper surface of the floor. If too little adhesive is applied, the panels will not be securely fastened and may later move relative to one another and become dislodged. Moreover, upon laying each panel the adhesive must be allowed to dry
20 to ensure secure positioning of the panel before attempting to fasten an adjoining panel. The process of laying a floor is therefore laborious and time-consuming, and it is costly to employ a worker to fit such flooring.

Furthermore, the application of adhesive to each
25 individual joint is inconvenient and may also be undesirable for reasons of health and safety.

A further drawback of the abovementioned system is that once the panels have been fitted together, they cannot subsequently be removed and repositioned. A fitter must therefore take utmost care to ensure that the each panel is
5 correctly laid as mistakes cannot later be rectified. If a panel later becomes damaged or worn, it cannot be replaced individually and can only be renewed by dismantling and replacing the entire floor. The panels of the dismantled floor cannot be reused since they will be damaged upon
10 dismantling. Once fitted, the panelled floor is thus a permanent fixture which cannot be taken up, for example for underfloor maintenance, without destroying the flooring panels. This deters many potential customers from installing such flooring.

15 An alternative method of laying building panels is described in EP0855482. This discloses a method whereby panels may be secured together mechanically without the need for adhesive. The panels may be taken apart, repositioned and reused or replaced if necessary. Whilst
20 the method of EP0855482 addresses some of the aforementioned problems, the panels are expensive to manufacture since a high degree of precision is necessary to produce joints which connect firmly and securely to provide a uniform surface.

25 It is an object of the present invention to address at least some of the abovementioned problems.

According to a first aspect of the invention there is provided a building panel for connecting with other like panels, said panel including an edge surface for contacting an edge surface of another like panel, wherein said edge
5 surface is provided with a pressure sensitive adhesive.

According to a second aspect of the invention there is provided a method of producing a building panel including the step of applying a pressure sensitive adhesive along an edge surface thereof.

10 According to a third aspect of the invention there is provided a method for joining building panels each having an edge surface, including the step of

applying a pressure sensitive adhesive to at least one of said edge surfaces, and

15 contacting an edge surface of a panel with an edge surface of another panel to form a joint between the panels.

Preferably, according to the third aspect, the panels are laid in consecutive rows.

20 According to the above aspects of the invention, the edge surface preferably includes an interlocking means enabling it to interlock with an edge surface of a contiguous panel. Preferably, the edge surface is complementary in profile to an edge surface of another
25 panel with which it is to be interlocked. Preferably, the panel includes a plurality of edge surfaces.

The edge surface may, for example, have a lengthwise protrusion and/or a groove-shaped profile enabling it to interlock with an edge of a contiguous panel via a tongue-and-groove or similar mechanism.

5 The panel preferably has straight edges. More preferably, the panel is substantially quadrilateral in shape, yet more preferably rectangular. This enables a panel to interlock easily with adjacent panels to form a regular array of tessellating panels.

10 The panel may be made from one or more materials. Such materials may include wood and wood-derived materials such as chipboard, medium- and high-density fibreboard, cardboard, fibreglass, polymers and plastics. In a preferred embodiment, the panel comprises a plurality of
15 layers.

 The pressure sensitive adhesive may comprise water-borne, hot melt or solvent-borne adhesive, or a combination thereof. Preferably, the pressure sensitive adhesive is hot melt adhesive, since this offers the advantage of
20 having a short drying time, thereby increasing production rate and reducing the cost of manufacture. Alternatively or additionally, water-borne pressure sensitive adhesive may be used.

 The adhesive may be applied by any known method.
25 Typically it may be applied as a fluid which is then allowed to dry to form a film. Components of the adhesive

preferably include polymer latex and a resin or tackifier. Polymer latexes may be based on acrylic, vinyl acetate, natural rubber, styrene-butadiene and neoprene rubber polymers. Resins may be rosin-based or hydrocarbon based.

5 The adhesive may include one or more further components selected from the following: plasticisers, wetting agents, thickeners, defoamers and biocides. The composition of the pressure sensitive adhesive will depend upon the desired properties, including elastic and viscous
10 modulus, of the finished article.

 The pressure sensitive adhesive may be applied to one or more edge surfaces of the panel. The edge surface of the panel may include a recess, for example a groove. Preferably the pressure sensitive adhesive is applied with
15 the recess. The panel may then be packaged and stored conveniently without risk of the pressure sensitive adhesive contacting the packaging or other material. The pressure sensitive adhesive will also be less likely to be exposed to dust.

20 Building panels according to the present invention are both cost-effective and quick to manufacture. Furthermore, they can be fitted together easily and rapidly without the need for a specialist fitter. Once laid, the panels will not become dislodged as they are held together by adhesive.
25 However, the panels may still be taken apart easily and reused or replaced without being damaged.

The invention will now be described in detail, by way of example only, with reference to the accompanying drawings in which:

Figure 1 is a cross section of respective edge
5 surfaces of two vicinal building panels according to a first preferred embodiment of the invention.

Figure 2 is a cross section showing the edge surfaces of two vicinal building panels connected together according to a first preferred embodiment of the invention.

10 Figure 3 is a cross section of respective edge surface of two vicinal building panels according to a second preferred embodiment of the invention.

Referring to Figure 1, a first panel 1 and a second panel 2 each comprise a core of high density fibreboard 3.
15 The core is backed by a protective layer 4 which acts as a balancer sheet. On an upper surface the panels are provided with a decorative layer 5 and a transparent protective overlay 6 to enhance visual appearance and durability. The decorative layer may be patterned and/or
20 coloured.

Although not shown in the drawings, the panels are rectangular in shape, thus enabling them to be interlock together in a regular array to form a uniform surface without gaps.

25 As shown in Figure 1, the first panel 1 includes an edge surface 9 comprising a protrusion 10 along its length,

and an edge surface 15 having a groove 16 which is complementary in profile to the protrusion 10. Figure 1 also shows part of an adjacent, second panel 2 having an edge surface 20 and a groove 21 which is complementary in profile to the protrusion 10, thereby enabling the first and second panels to interlock firmly together in a configuration as shown in Figure 2.

The panels may be produced by any suitable method. Typically, the tongue-and-groove profiles along the edges of the panels are formed by cutting using a rotor.

In the present embodiment, contact surfaces 17a and 17b are coated with a layer of pressure sensitive adhesive 18. The adhesive is applied using a standard method, preferably via a hot-melt process at high temperature. Once interlocked, the contact surface 17a of the first panel abuts with contact surface 17b of the second panel to provide a flush joint which is not immediately evident when viewed from the upper surface. Upon interlocking, the pressure sensitive adhesive 18 on the contact surfaces 17a, 17b is compressed, thereby holding the panels securely in position as shown in Figure 2. The panels can however be taken apart, since the adhesive does not form a permanent bond. The panels may therefore be dismantled, repositioned and/or reused if desired, and worn or damaged panels may be replaced individually without the need to replace the entire surface. The pressure sensitive adhesive offers an

additional advantage of improving water resistance along the joint between the panels when compared with glueless systems.

In the present embodiment, once the panels are
5 interlocked in the configuration shown in Figure 2, the lower edge surface 20a of the first panel remains spaced apart from the lower edge surface 20b of the second panel to allow an expansion gap in the event of variations in temperature and/or humidity.

10 In the present embodiment, both contacting surfaces 17a and 17b are coated with adhesive. In an alternative embodiment, only one of the contacting surfaces may be provided with adhesive. Alternatively, either or both contacting surfaces 17a, 17b may be partially coated with
15 pressure sensitive adhesive. For example, the surface of the tongue alone may be coated with adhesive, and/or an upper region of the edge surface.

Referring to Fig. 3, which shows a second preferred embodiment of the invention, a first panel 300 and a second
20 panel 301 each comprise a core of high density fibreboard 3. As in the embodiment of Figs. 1 and 2, the core is backed by a protective layer 4 which acts as a balancer sheet. On an upper surface the panels are provided with a decorative layer 5 and a transparent protective overlay 6
25 to enhance visual appearance and durability. The decorative layer may be patterned and/or coloured.

The first panel 300 is provided with an edge portion 30 comprising a protrusion 39 along its length. A groove 31a runs along an upper region of the edge surface 30, and contains a pressure sensitive adhesive 32a. A further
5 surface 34a as shown is provided with pressure sensitive adhesive 35a.

A second panel 301 has an edge portion 37 which is complementary in profile to that of the first panel, thus enabling the two panels to interlock snugly together. A
10 groove 31b is located along an upper region of the edge portion and contains a pressure sensitive adhesive 32b. The groove 31b is located such that upon joining of the two panels 300, 301, the pressure sensitive adhesive 32a, 32b in each of the grooves 31a, 31b butts together to form an
15 adhesive bond.

A further layer of pressure sensitive adhesive 35b is located on sloping surface 34b. Upon interlocking of the two panels, surfaces 34a and 34b are butted together such that the adhesive 35a, 35b forms an adhesive bond.

20 An advantage of the second embodiment as shown in Fig. 3 is that the pressure sensitive adhesive 32a, 32b, 35a and 35b is located such that its exposure to dust and, for example, to the surface of a packaging carton, is minimised.

25 Furthermore, other variations and modifications to the present embodiment may be envisaged without departing from

the scope of the invention. For example, the panels need not comprise tongue-and-groove joints, but may employ other means of joining together adjacent panels.

CLAIMS

1. A building panel for connecting with other like panels, the panel including an edge surface for
5 contacting an edge surface of another like panel,
wherein said edge surface is provided with a pressure sensitive adhesive.
2. A building panel according to claim 1 wherein the edge surface includes an interlocking means for
10 enabling it to interlock with an edge surface of a contiguous panel.
3. A building panel according to claim 1 or claim 2 wherein the edge surface is complementary in profile to an edge surface of another panel with which it is to be
15 interlocked.
4. A building panel according to any one of the preceding claims wherein the panel includes a plurality of edge surfaces.
5. A building panel according to any one of the
20 preceding claims wherein the edge surface has a lengthwise protrusion and/or a groove-shaped profile enabling it to interlock with an edge of a contiguous panel via a tongue-and-groove or similar mechanism.
6. A building panel according to any one of the
25 preceding claims wherein the panel comprises a

plurality of layers.

7. A building panel according to any one of the preceding claims wherein the pressure sensitive adhesive comprises water-borne, hot melt or solvent-borne adhesive, or a combination thereof.

8. A building panel according to any one of the preceding claims wherein the adhesive includes polymer latex and a resin or tackifier.

9. A building panel according to any one of claims 7 or 8 wherein the adhesive further includes one or more components selected from the following: plasticisers, wetting agents, thickeners, defoamers and biocides.

10. A building panel according to any one of the preceding claims wherein the pressure sensitive adhesive is applied within a recess on the edge surface.

11. A building panel according to any one of the preceding claims wherein the edge surface is partially coated with pressure sensitive adhesive.

12. A method of producing a building panel including the step of applying a pressure sensitive adhesive along an edge surface thereof.

13. A method for joining building panels each having an edge surface, including the step of

applying a pressure sensitive adhesive to at least

one of said edge surfaces, and

contacting an edge surface of a panel with an edge surface of another panel to form a joint between the panels.

5 14. A method according to claim 13 wherein the panels are laid in consecutive rows.

15. A method according to any one of claims 12-14 wherein the adhesive is applied as a fluid and is then allowed to dry to form a film.

10 16. A method according to any one of claims 12-15 wherein the adhesive comprises water-borne, hot melt or solvent-borne adhesive, or a combination thereof.

17. A method according to any one of claims 12-16 wherein the adhesive includes polymer latex and a resin or tackifier.

15 18. A method according to any one of claims 16 or 17 wherein the adhesive further includes one or more components selected from the following: plasticisers, wetting agents, thickeners, defoamers and biocides.

20 19. A method of producing a floor surface comprising interlocking a plurality of panels of any one of claims 1-11 so that the edge surfaces but together to form a uniform floor surface.

25 20. A building panel substantially as hereinbefore described, with reference to the accompanying drawings.

21. A method substantially as hereinbefore described,
with reference to the accompanying drawings.



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Claims searched: All

Examiner: James Hull
Date of search: 29 October 2002

Patents Act 1977 Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:
UK Cl (Ed.T): E1D (DLEQWCV, DLEQWCW, DLEQWSV, DLEQWSW, DLEQWNV, DLEQWNW)
Int Cl (Ed.7): E04F (15/02, 15/04)
Other: ONLINE DATABASES: WPI, EPODOC, JAPIO.

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB 2355025 A TRADE FABRICATION SYSTEMS. See page 2 line 12. A flooring panel 2 having a hot melt pressure sensitive adhesive coating 5 positioned on tongue part 3 of 'tongue-and-groove' connection.	1 to 9, 11 to 19
X	JP 11131607 A IBIDEN. See Abstract. A floor panel 1 has a packing material 2 with pressure sensitive adhesive in groove 1b.	1, 4, 10, 11 & 12
X	JP 7305487 A NODA CORP. See Abstract and Figures. Floorbaord with joint section pressure sensitive adhesive layer 4a.	1 to 9, 11 to 19

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.